

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 12440340/EJH/ar	FOR FURTHER ACTION		see Form PCT/ISA/220 as well as, where applicable, item 5 below
International application No. PCT/AU2004/000524	International filing date (day/month/year) 23 April 2004	(Earliest) Priority Date (day/month/year) 23 April 2003	
Applicant HEXIMA LTD et al			

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 6 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☒ Certain claims were found unsearchable (See Box No. II).3. ☒ Unity of invention is lacking (See Box No. III).

4. With regard to the title,

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

Insect Chymotrypsin and Inhibitors thereof

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

- b. ☒ none of the figures is to be published with the abstract.

BEST AVAILABLE COPY

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 29-43, 47, 48 (partially)
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

See Supplemental Box

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See Supplemental Box

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☒ No protest accompanied the payment of additional search fees.

BEST AVAILABLE COPY

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. C12N 9/76, 15/57, 15/12; A01H 5/00; A01N 63/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

SEE BELOW

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SEE BELOW

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DGENE, SWISS PROT, EMBL, GENBANK, PIR: SEQ ID NO: 2, 3 and 5 (BLASTN, BLASTX)

WPIDS, MEDLINE, CA BIOSIS : chymotrypsin: sepharose; benzamidine: affinity chromatography; inhibitor

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Heath, R. L. et al., 1997, Proteinase inhibitors from <i>Nicotiana glauca</i> enhance plant resistance to insect pests, <i>Journal of Insect Physiology</i> , 43:833-842	1-48
A	Bown, D. P. et al. 1997, Differentially regulated inhibitor-sensitive and insensitive protease genes from the phytophagous insect pest, <i>Helicoverpa armigera</i> , are members of complex multigene families, <i>Insect Biochemistry and Molecular Biology</i> , 27:625-638.	1-48



Further documents are listed in the continuation of Box C



See patent family annex

<ul style="list-style-type: none"> • Special categories of cited documents: 	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

17 June 2004

Date of mailing of the international search report

08 JUL 2004

Name and mailing address of the ISA/AU

AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
E-mail address: pct@ipaaustralia.gov.au
Facsimile No. (02) 6285 3929

Authorized officer

TERRY MOORE

Telephone No : (02) 6283 2632

BEST AVAILABLE COPY

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
A	Gatehouse, L. N. et al., 1997, Characterisation of major midgut proteinase cDNAs from <i>Helicoverpa armigera</i> larvae and changes in gene expression in response to four proteinase inhibitors in the diet, <i>Insect Biochemistry and Molecular Biology</i> , 27:929-944.	1-48
A	Mazumdar-Leighton, S. and Broadway, R., 2001, Identification of six chymotrypsin cDNAs from larval midguts of <i>Helicoverpa zea</i> and <i>Agrotis ipsilon</i> feeding on the soybean (Kunitz) trypsin inhibitor, <i>Insect Biochemistry and Molecular Biology</i> , 31:633-644.	1-48
A	DE 3135541 A (Bayer AG) 24 March 1983 Abstract	46
A	Hjelmeland, K., and Raa, J., 1982, Characteristics of two trypsin type isozymes isolated from the arctic fish capelin (<i>Mallotus villosus</i>), <i>Comparative Biochemistry and Physiology B</i> , 71:557-62. Abstract	46
A	Sakal, E. et al., 1989, Purification and characterization of trypsins from the digestive tract of <i>Locusta migratoria</i> , <i>International Journal of Peptide and Protein Research</i> , 34:498-505 Abstract	46

Supplemental Box

Continuation of Boxes No II and III

Observations where certain claims were found unsearchable (Box II)

The scope of claims 29-43, 48 is so inadequately supported by the specification that a meaningful search covering the full scope of the claims could not be carried out. In particular, the claims do not define the matter for which protection is sought in terms of the technical features of the invention.

Claims 29-43 relate to an antagonist of a chymotrypsin HpCh5 from *Helicoverpa* spp, compositions comprising said antagonist and genetically modified plants that produce an antagonist of chymotrypsin HpCh5. With respect to antagonists of the chymotrypsin isolated from *Helicoverpa* it is considered that the invention extends to (a) substances that are derivatives of the gene identified in the present application, for example antisense, and (b) substances that are isolated in methods that necessarily utilise the protein and/or gene of the present invention.

No meaningful search can be performed on the full scope of the claims. As such, claims 29-43 have been searched in as far as they relate to derivatives of HpCh5 (eg antisense, antibodies) that antagonise its activity or expression.

Claim 47 has been searched with respect to the use of HpCh5 to screen for potential antagonists of its activity.

Claim 48 is directed to an inhibitor of chymotrypsin identified by a method of screening comprising contacting a NaPI-insensitive chymotrypsin with a potential antagonist and screening for chymotrypsin activity. This is not a claim to a derivative of HpCh5 or a compound produced using HpCh5, it is a claim that encompasses an independent compound that inherently antagonises HpCh5 and whose engineering or isolation owes nothing to the teachings of the patent application. Thus the claim may encompass known substances inherently possessing the stated properties. No meaningful search can be performed on the full scope of the claim. The claim has been searched in as far as it relates to a derivative of HpCh5 (eg antisense) that antagonises its activity or expression.

Observations where unity of invention is lacking (Box III)

The International Searching Authority found multiple inventions in this international application, as follows:

1. Claims 1-45, 47, 48 directed to a chymotrypsin polypeptide from *Helicoverpa* sp. wherein said polypeptide exhibits resistance to a proteinase inhibitor from *Nicotiana glauca*. The claims also relate to the nucleic acid molecule encoding said polypeptide, expression vectors and genetically modified cells comprising said nucleic acid molecules, and methods that use the chymotrypsin polypeptide from *Helicoverpa* sp.

It is considered that the chymotrypsin polypeptide and the nucleic acid molecule encoding it represents a first "special technical feature".

2. Claim 46 relating to a method for the isolation of individual isoforms of chymotrypsin based on sequential steps of affinity chromatography using benzamidine sepharose, the proteinase inhibitor C1 and Pot I, Pot II or chymostatin.. It is considered that this method represents a second "special technical feature".

Since the abovementioned groups of claims do not share any of the technical features identified, a "technical relationship" between the inventions, as defined in PCT rule 13.2 does not exist. Accordingly the international application does not relate to one invention or to a single inventive concept.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/AU2004/000524

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in
Search Report

Patent Family Member

DE 3135541 DK 399982 FR 2512445 JP 58055430

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX

BEST AVAILABLE COPY